

62255

Anorthosite with melt

1239 grams



Figure 1: Photo of 62255 showing glass splash on anorthosite. Cube is 1 cm. NASA S # S72-38309.

Introduction

Lunar sample 62255 is significant because it is largely composed of pristine anorthosite (Warren and Wasson 1977). Surprisingly, this material has not been thoroughly studied and an age has not been determined.

Petrography

Ryder and Norman (1979, 1980) summarized what was known about 62255 at that time. It consists of about 65% pristine ferroan anorthosite and 35% recrystallized impact melt rock (figure 1). The anorthosite is cataclastic and consists of plagioclase (An_{92-97}) with minor pyroxene (Wo_4En_{50} and $Wo_{45}En_{35}$). Some of the original grain boundaries are intact (figure 2).

See et al. (1986) and Morris et al. (1986) studied the dark glass splash coating on 62255 and other rocks. Ryder and Norman (1980) noted that it had a surface patina with micrometeorite craters on “most faces” and that it was apparently “perched”.

Mineralogy

Pyroxene: Hypersthene $Wo_4En_{50}Fs_{46}$ was reported by Schaal et al. (1976). Ryder and Norman (1979) reported both $Wo_{4-9}En_{45-50}$ and $Wo_{39-45}En_{34-36}$ (figure 4). Some pyroxene grains are large (2mm). Bersch et al. (1991) also reported the composition of pyroxenes in 62255.

Plagioclase: Schaal et al. (1976) report that the plagioclase in 62255 anorthosite is An_{92-96} . Plagioclase grains up to 6 mm were reported. Meyer (1979) determined trace elements in plagioclase in 62255.

Chemistry

Taylor et al. (1975) measured the composition of the white anorthositic portion of 62255 (figure 6) and Hertogen et al. (1977) found it to be low in meteoritic siderophiles (table 1).

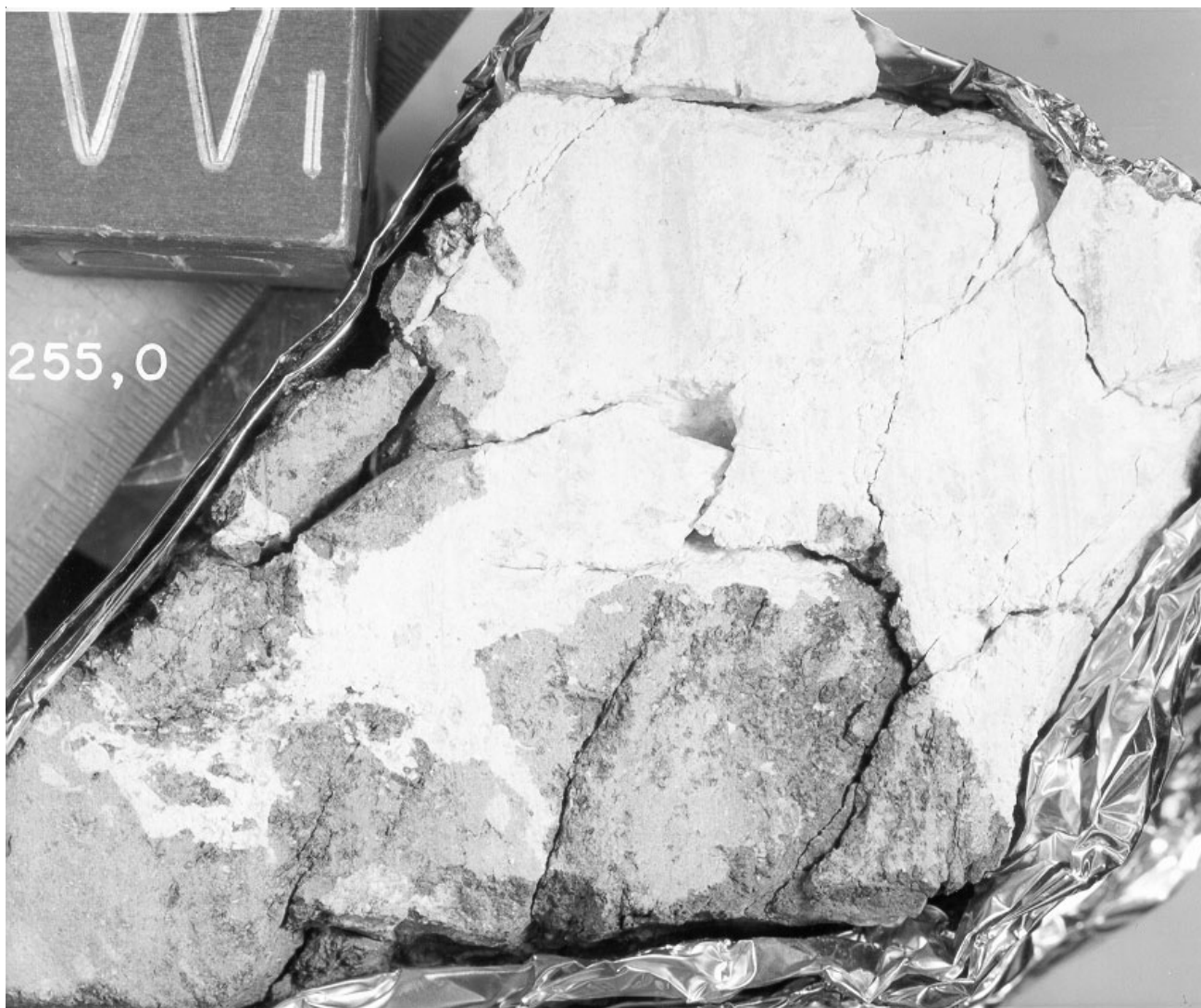


Figure 2: Photo of sawn surface of 62255,0 showing anorthosite surrounded by impact melt. Cube is 1 inch for scale. NASA S75-33052.

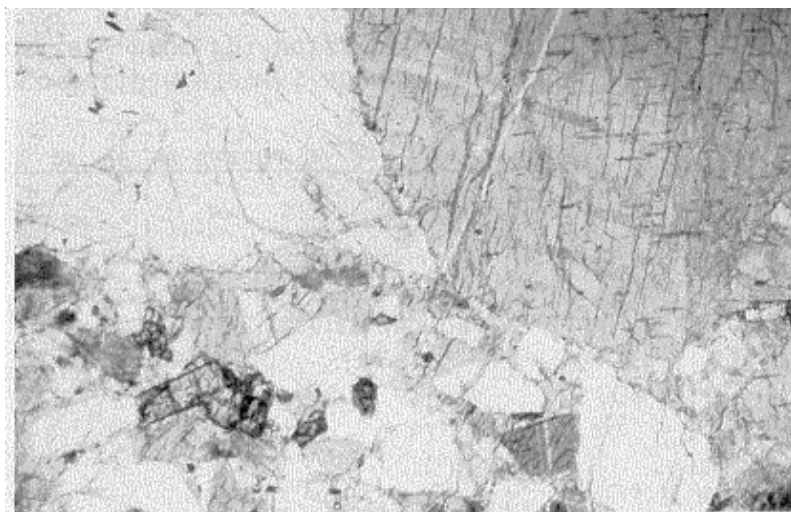


Figure 3: Photomicrograph of thin section of 62255 showing large plagioclase and small pyroxene. Field of view 2 mm.

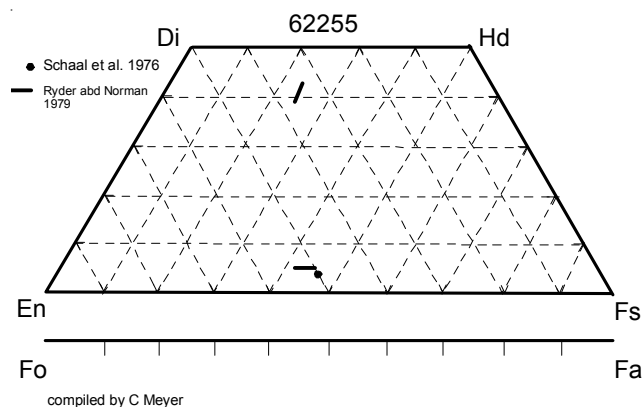


Figure 4: Composition of mafic minerals in 62255 anorthosite as reported (but never studied in detail).

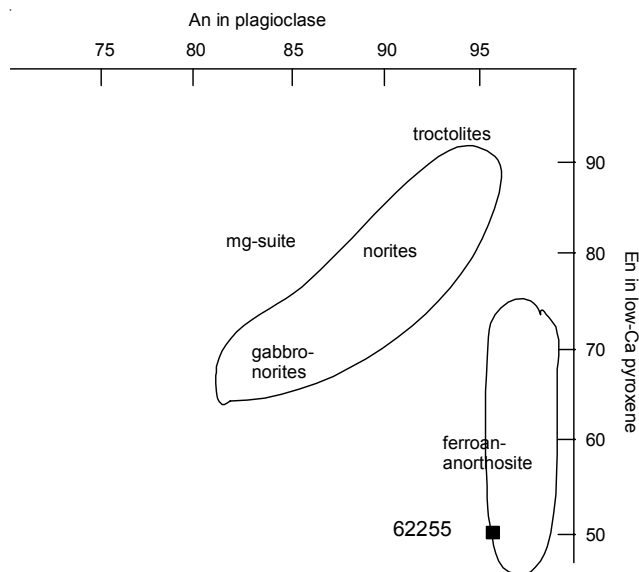


Figure 5: The white portion of 62255 is a ferroan anorthosite.

Radiogenic age dating

The only radiometric dating was by Jessberger et al. (1977), who were unable to obtain a satisfactory Ar/Ar plateau age for a “pyroxene-rich clast” from 62255.

Cosmogenic isotopes and exposure ages

Jessberger et al. (1977) reported an ^{38}Ar exposure age of 3 ± 1 m.y. Ryder and Norman (1980) report an ^{81}Kr age of 1.9 m.y. (apparently from Marti 1975 pers. comm.)

Other Studies

Brownlee et al. (1975) and Schaal et al. (1976) studied the glass linings of impact craters on the surface of anorthosite portion of 62255 (figure 7). They found that the composition of the glass lining the crater was close to that of the underlying substrate (plagioclase) (figure 8).

Lightner and Marti (1974) determined the isotopic composition of rare gases in 62255.

Padawer et al. (1974) studied depth profiles of F and Cl in 62255, but found they were due to contamination by Teflon packaging.

Housley et al. (1976) found that ferromagnetic resonance absorption was weak.

Processing

62255 was sawn in half, exposing the interior (figure 2).

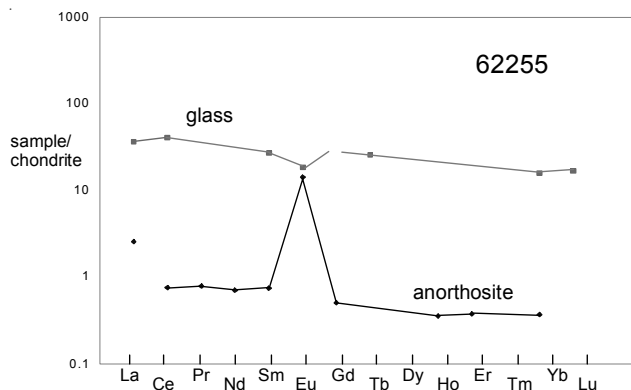


Figure 6: Normalized rare-earth-element diagram of 62255 anorthosite and of black glass coating (data from Taylor et al. and Morris et al. 1986).

Table 1. Chemical composition of 62255.

reference weight	Taylor 75	Hertogen 77	Morris 86	glass coat
SiO ₂ %	44.1	(a)	45.28	(d)
TiO ₂			0.36	(d)
Al ₂ O ₃	35.3	(a)	25.46	(d)
FeO	0.2	(a)	5.93	(d)
MnO				
MgO	0.37	(a)	8.03	(d)
CaO	19.1	(a)	14.29	(d)
Na ₂ O	0.49	(a)	0.59	(d)
K ₂ O	0.09	(a)	0.11	(d)
P ₂ O ₅				
S %				
sum				
Sc ppm			5.4	(d)
V	7	(b)		
Cr	17	(b)	820	(d)
Co			63	(d)
Ni		1.6	(c) 1317	(d)
Cu				
Zn		0.31	(c)	
Ga				
Ge ppb		5.8	(c)	
As				
Se		2.9	(c)	
Rb		0.025	(c)	
Sr				
Y				
Zr	0.45	(b)		
Nb				
Mo				
Ru				
Rh				
Pd ppb		0.13	(c)	
Ag ppb		2	(c)	
Cd ppb		3.8	(c)	
In ppb		1.7	(c)	
Sn ppb				
Sb ppb		0.54	(c)	
Te ppb		2.9	(c)	
Cs ppm		0.0005	(c)	
Ba	14.6	(b)	92	(d)
La	0.6	(b)	8.68	(d)
Ce	0.46	(b)	24.8	(d)
Pr	0.07	(b)		
Nd	0.32	(b)		
Sm	0.11	(b)	4.04	(d)
Eu	0.8	(b)	1.04	(d)
Gd	0.1	(b)		
Tb			0.94	(d)
Dy				
Ho	0.02	(b)		
Er	0.06	(b)		
Tm				
Yb	0.06	(b)	2.68	(d)
Lu			0.43	(d)
Hf			3.01	(d)
Ta			0.47	(d)
W ppb				
Re ppb		0.0087	(c)	
Os ppb		0.018	(c)	
Ir ppb		0.016	(c)	
Pt ppb				
Au ppb		0.062	(c)	
Th ppm			1.94	(d)
U ppm		1.37	(c) 0.46	(d)

technique: (a) e. probe, (b) SSMS, (c) RNAA, (d) INAA

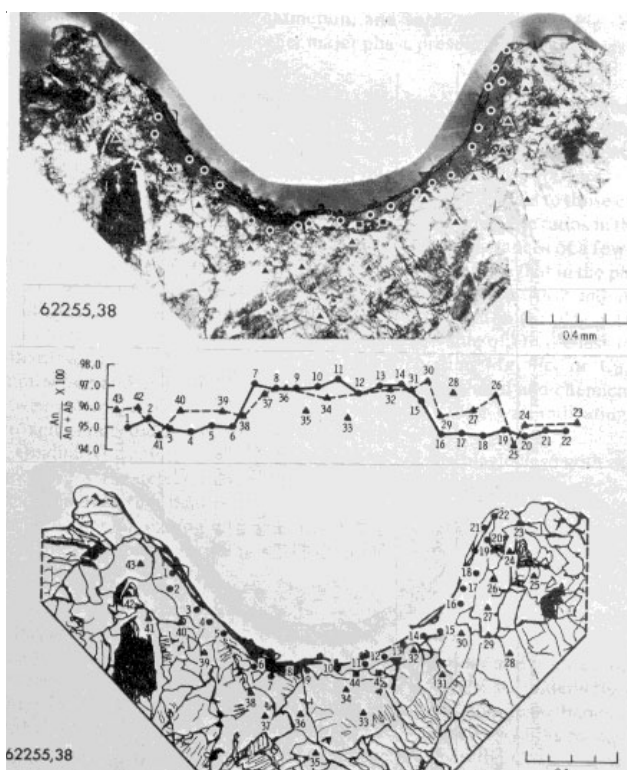


Figure 7: Cross section of large micrometeorite crater in plagioclase portion of 62255 (from Schaal et al. 1976).

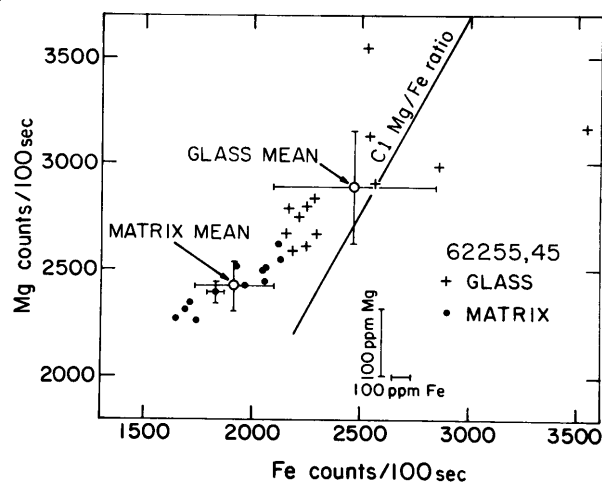


Figure 8: Composition of glass lining crater in plagioclase on 62255 (from Brownlee et al. 1975).

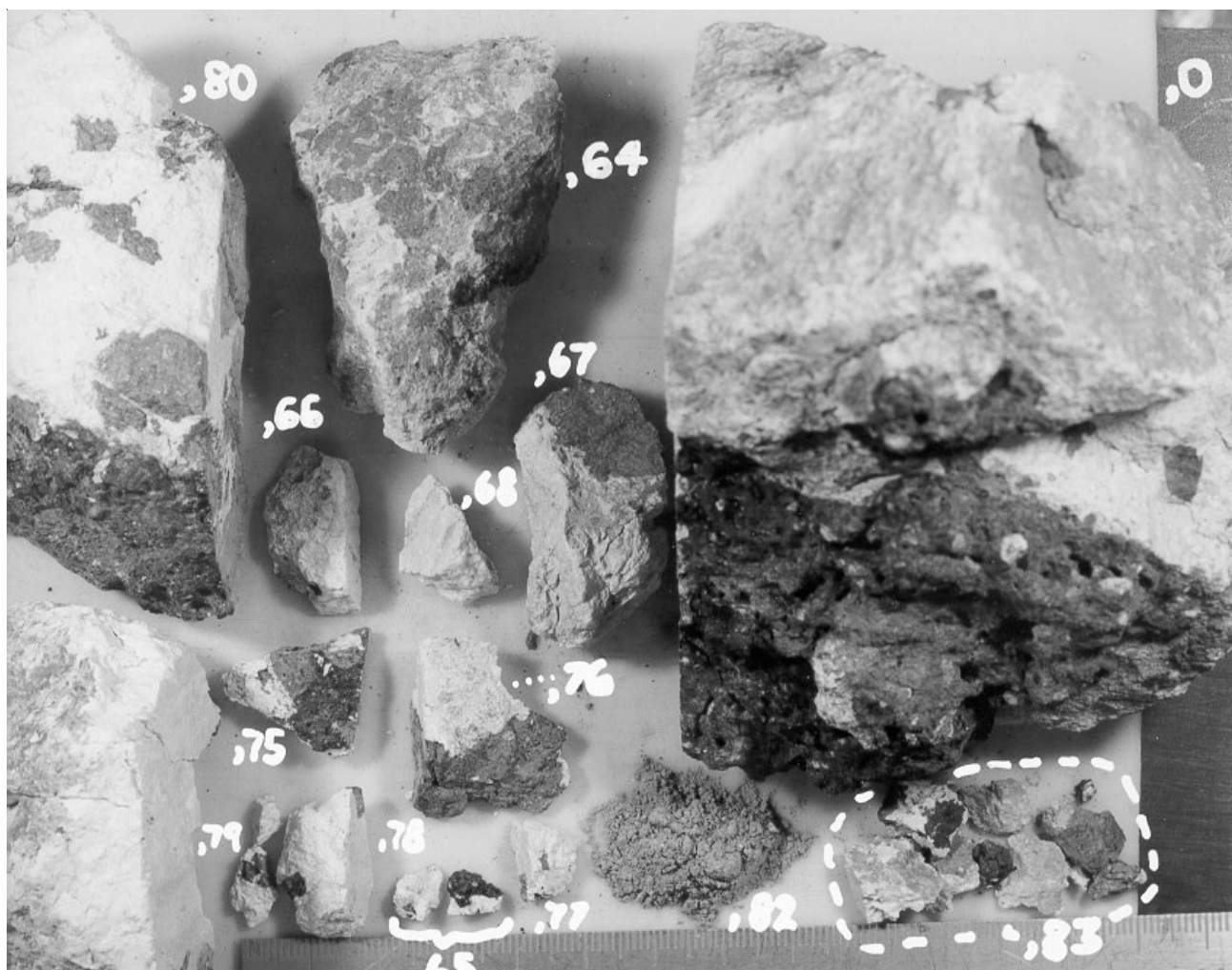
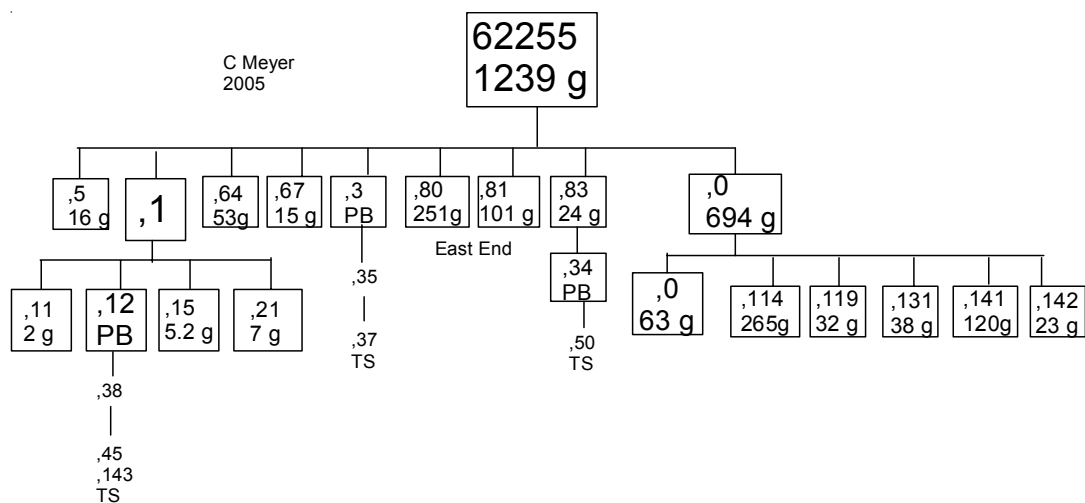


Figure 9: A saw cut in 1975 yielded a large piece (,0) and several smaller pieces. NASA S75-33040. Ruler is marked in cm.



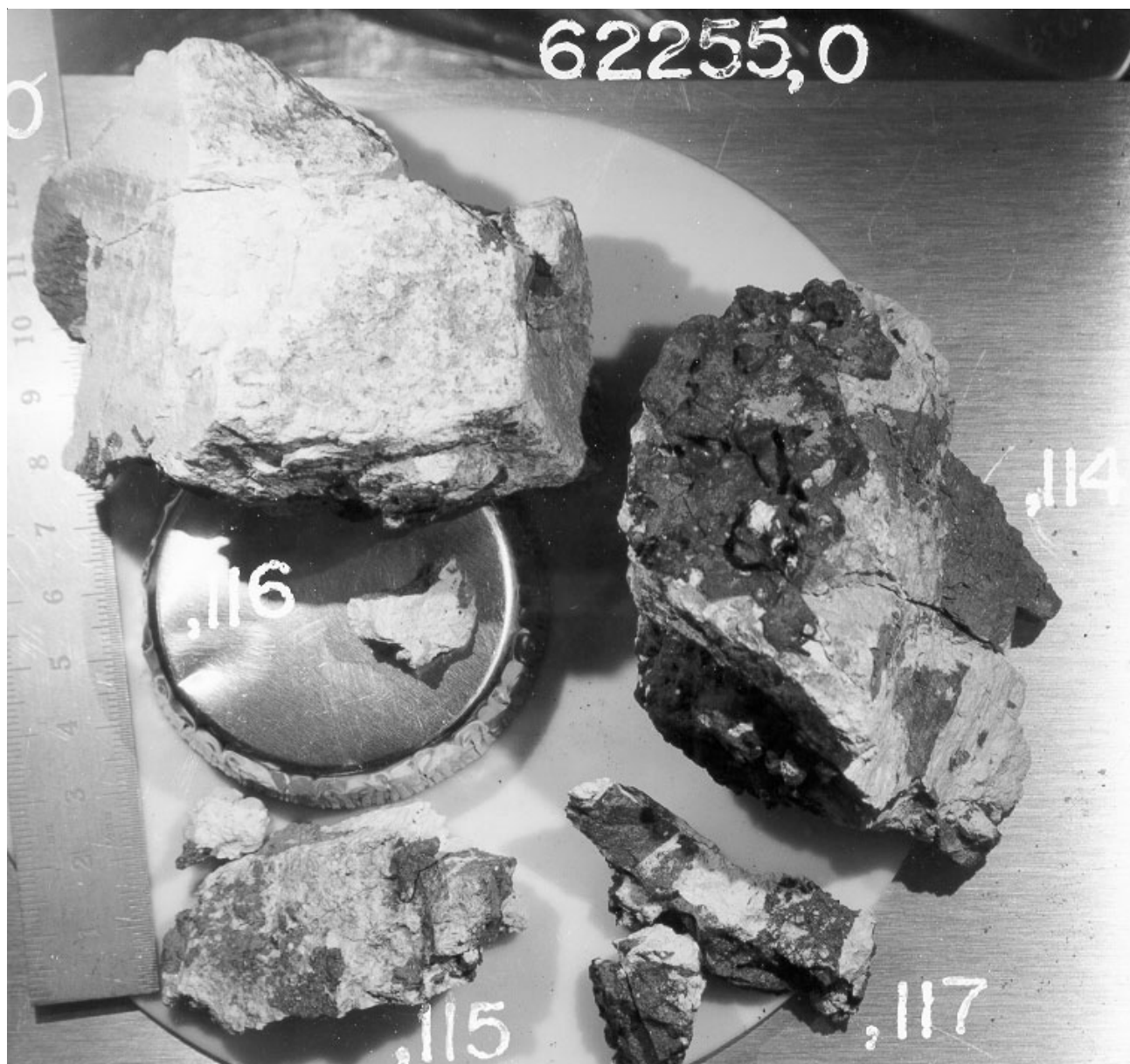


Figure 10: 62255,0 was further subdivided in 1993. Ruler in cm. NASA S93-040245.